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Teaching in times of crisis: A cross-sectional study of lifestyle, stress, and anxiety among educators during COVID-19

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Abstract

The COVID-19 pandemic has had a significant impact on educators, altering their work routines, increasing stress, and affecting their overall well-being. This study assessed teachers' lifestyles, stress, and anxiety levels during the COVID-19 pandemic and implemented an intervention to promote healthy eating. A cross-sectional, quantitative study was conducted among 105 teachers, who completed an online questionnaire that included sociodemographic items, the FANTASTIC lifestyle questionnaire, and the anxiety, depression, and stress scale (EADS-21). Most participants were female (88.6%), over 51 years old (60%), and had over 15 years of teaching experience (86.7%). The transition to remote teaching required 93.3% of participants to reorganize their schedules and 89.5% to modify their lifestyle and family routines, resulting in over half of the participants expressing dissatisfaction with remote teaching. The EADS-21 results indicated that the stress subscale had the highest mean score (0.98). The study emphasizes the importance of targeted health promotion strategies for educators during times of crisis. Future research should explore the long-term impact of such interventions on teachers' mental health and professional performance.

Keywords: Teachers; Community nursing; Lifestyle; Stress; Anxiety; COVID-19

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1. Introduction

The COVID-19 pandemic profoundly affected various professional groups, including educators, who faced abrupt and unprecedented changes in their work environments (d'Orville, 2020). The transition from in-person to remote teaching introduced numerous challenges, significantly altering daily routines, increasing workloads, and intensifying stress and anxiety levels. This shift to e-learning environments posed substantial pedagogical and technological challenges for teachers across various educational systems. In Western contexts, several studies highlighted how educators had to rapidly adapt to digital tools, online platforms, and new modes of student interaction (Lavidas *et al.*, 2022). Studies of key factors influencing teachers' engagement and participation

in web-based educational research during the pandemic revealed how digital readiness and institutional support affected response behaviors and teaching adaptation. These findings underscore the global scope of the challenges educators faced in sustaining instructional quality through e-learning modalities during the COVID-19 pandemic.

Educators, already identified as a professional group highly susceptible to occupational stress, experienced additional pressure due to the sudden shift in teaching modalities, uncertainty about the pandemic's duration, and concerns about their health and well-being (Anis, 2024; Kotowski *et al.*, 2022; Stang-Rabrig *et al.*, 2022).

Similar patterns have been reported worldwide, highlighting the global nature of this phenomenon. Studies from the United States and Canada revealed increased rates of teacher burnout and emotional exhaustion linked to remote teaching and reduced institutional support (Agyapong *et al.*, 2024; Marshall *et al.*, 2023). In Asian contexts, particularly in China and India, educators reported elevated stress due to technological overload and a lack of pedagogical flexibility (Hung, 2023; Jia, 2025). In African countries, such as South Africa and Kenya, the limited digital infrastructure further intensified the psychological burden among teachers adapting to virtual environments (Jibrin *et al.*, 2024; Woldegiorgis, 2023). Latin American studies echoed similar concerns, emphasizing socioeconomic disparities and inconsistent access to digital tools as exacerbating factors (Camacho Gutiérrez, 2024).

Collectively, these findings underscore that while the pandemic's educational impact was global, regional responses and teacher experiences varied according to local socio-cultural and institutional contexts. Situating the present Portuguese study within this broader discourse allows for comparative insight into how educators in different systems navigated the shared challenge of sustaining teaching quality and mental well-being during crises.

The psychological and emotional toll on teachers during this period cannot be overstated. Stress and anxiety affected their personal lives and influenced their professional effectiveness, engagement with students, and overall job satisfaction (Deng *et al.*, 2022; Gonçalves & Matos, 2024; Jamil *et al.*, 2023). Prolonged exposure to stressors, such as adapting to new technology, managing virtual classrooms, and balancing work–life responsibilities, exacerbated feelings of fatigue and emotional exhaustion. The reduction in direct social interaction with colleagues and students further contributed to a sense of isolation, potentially leading to higher levels of anxiety and depression (Brandt *et al.*, 2022; Moreira *et al.*, 2024; Singh *et al.*, 2022).

Beyond mental health concerns, the pandemic also prompted significant lifestyle changes among educators. Factors, such as dietary habits, physical activity levels, sleep patterns, and substance use, were influenced by lockdowns and remote work constraints (de Reviers *et al.*, 2023). Limited access to outdoor activities, increased screen time, and disrupted eating patterns created a complex situation in which many teachers struggled to maintain a balanced and healthy lifestyle. These changes, in turn, may have had long-term consequences on both physical and mental well-being (Aguiar *et al.*, 2024; Lekše *et al.*, 2023; Zong *et al.*, 2024).

Given the substantial impact of the pandemic on educators, it is crucial to assess their lifestyle, stress, and anxiety levels to develop targeted interventions that promote well-being. This study aims to explore these critical areas. By examining the correlation between stress, anxiety, and lifestyle factors, the research seeks to provide valuable insights into how professional and personal well-being can be supported during crises, such as the COVID-19 pandemic.

2. Data and methods

2.1. Study design and participants

This study employed a cross-sectional, descriptive-correlational design with a quantitative approach, conducted between February and May 2022. The target population consisted of teaching professionals from the school groups served by the primary care unit (PCU) in the municipality of Porto. Of the six school groups, two were included in the sample frame, comprising 292 teachers in total. This was a non-probabilistic sample, which, according to Fortin (2000), is a form of selection where each element of the population does not have an equal probability of being chosen to construct the sample. According to the same author, there are several types of non-probabilistic samples. In this study, convenience sampling was used, which involves selecting individuals who were easily accessible and present in a specific location (Fortin, 2000).

The sample comprised 105 primary and secondary education teachers who were working during the COVID-19 pandemic. Participants were recruited through convenience sampling, and informed consent was obtained before data collection.

The cross-sectional and quantitative design was selected because it enabled the identification of relationships between psychosocial variables (stress, anxiety, and lifestyle) and sociodemographic characteristics within a specific timeframe. This approach is appropriate for public health studies seeking to describe prevalence and

associations rather than causality (Fortin, 2000). The convenience sampling method was justified by limited accessibility to participants during COVID-19 restrictions and the need to reach educators across multiple schools within the PCU's jurisdiction. Although this method may limit generalizability, it provided a feasible and representative snapshot of the target teaching population during the pandemic context.

Teachers who were part of the staff of school groups served by the PCU in the municipality of Porto, Portugal, were included in the study. However, teachers who did not respond to at least 80% of the questionnaire were excluded from the analysis. Figure 1 presents the participant selection process, from the initial target population to the final study sample, including the exclusion criteria and response rates.

2.2. Data collection

Data were collected between February and May 2022 using an online questionnaire distributed via Google Forms. The questionnaire was structured into four sections: (i) Sociodemographic and professional variables; (ii) impact of the COVID-19 pandemic, which included perceptions of lifestyle and work routine changes due to remote teaching; (iii) lifestyle assessment; and (iv) mental health assessment using the anxiety, depression, and stress scale (EADS-21). It consisted of 21 items rated on a four-point Likert scale (0 = "Did not apply to me at all" to 3 = "Applied to me very much, or most of the time"), generating three subscale scores. The Portuguese version has demonstrated high internal consistency (Cronbach's $\alpha > 0.90$) (Pais-Ribeiro *et al*., 2004).

The questionnaire was pretested with 10 teachers from a similar population to ensure clarity and relevance of items. Data were collected anonymously through Google Forms and automatically exported to Microsoft Excel, where they were subsequently imported into the Statistical Package for Social Sciences software (version 20) for analysis. Data were screened for completeness; responses with more than 20% missing data were excluded according to the pre-defined exclusion criteria. All variables were coded consistently, and continuous variables were checked for normality using the Shapiro–Wilk test. Internal consistency for each scale was assessed using Cronbach's alpha coefficients, all exceeding 0.90 for the EADS-21 subscales, confirming excellent reliability.

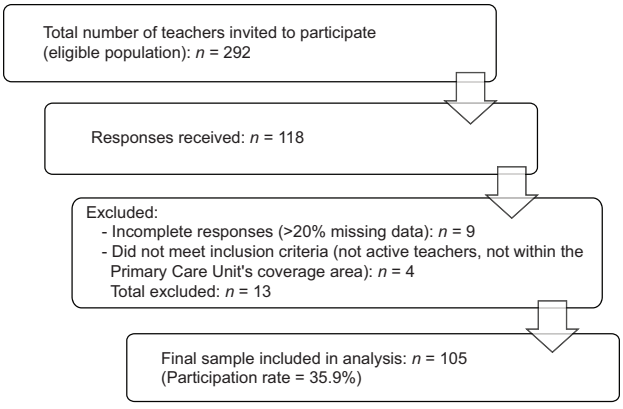

Figure 1. Flow chart of participant selection process

2.2.1. Variables and measurement

The main outcome variables were levels of stress, anxiety, and depression, assessed using the EADS-21, validated for the Portuguese population (Pais-Ribeiro *et al*., 2004). Each dimension was scored on a four-point Likert scale (0–3), with higher scores indicating greater psychological distress.

The principal exposure variables were lifestyle behaviors assessed using the FANTASTIC Lifestyle Questionnaire (Silva *et al*., 2014), which evaluated 10 lifestyle domains—family and friends, activity, nutrition, tobacco, alcohol and drugs, sleep and stress, work/personality type, insight, health and sexuality, and other behaviors. Higher total scores represented healthier lifestyle patterns.

Predictor and confounding variables included sociodemographic and professional characteristics (age, gender, marital status, teaching level, & years of experience), as well as contextual factors related to remote teaching (adaptation to distance learning, fear of SARS-CoV-2 infection, & difficulty sleeping). These variables were collected through self-report items in the first section of the questionnaire.

No diagnostic criteria were applied, as the study aimed to measure symptom levels and lifestyle characteristics rather than establish clinical diagnoses, using validated psychometric instruments.

2.2.2. Efforts to address bias

Several steps were taken to minimize potential sources of bias. To reduce selection bias, all eligible teachers within the school groups served by the PCU were invited to participate, and responses were collected anonymously to encourage broad engagement. To limit response bias and social desirability effects, participants were assured of confidentiality and informed that there were no right or wrong answers. The online format reduced the interviewer's influence, allowing participants to complete the questionnaire privately at their convenience. Measurement bias was minimized by employing validated instruments (EADS-21 & FANTASTIC lifestyle questionnaire), which have demonstrated psychometric

reliability for the Portuguese population. Finally, potential recall bias was mitigated by focusing on behaviors and emotions experienced during the COVID-19 confinement period, rather than relying on distant retrospective self-reports.

2.3. Research question and hypothesis

2.3.1. Research question

During the confinement phase associated with SARS-CoV-2 infection, requests for psychological support arose due to difficulties in managing emotions and feelings, adjusting to new daily routines, and coping with the disruption of interpersonal relationships. Consequently, the theme "Teachers' Lifestyles, Anxiety and Stress in the Context of the SARS-CoV-2 Pandemic" was considered particularly relevant. In this context, the following research questions were formulated:

(i) What is the impact of the pandemic on the lifestyles, anxiety, depression, and stress of teachers in the school groups served by the PCU in the municipality of Porto?
(ii) What is the relationship between the perception of anxiety, depression, and stress in teachers from the school groups served by the PCU in the municipality of Porto and their sociodemographic variables?
(iii) What is the relationship between fear of infection, adaptation to the new teaching context, difficulty sleeping, and increased anxiety, depression, and stress in teachers from the school groups served by the PCU in the city of Porto?

2.3.2. Hypothesis

Based on the research questions, the following hypotheses were formulated:

(i) H_1: There is a relationship between anxiety, depression, and stress in teachers from the school groups served by the PCU in the municipality of Porto and the sociodemographic and professional variables during the COVID-19 pandemic.
(ii) H_2: There is a relationship between the overall score of the FANTASTIC Lifestyle Questionnaire among teachers from the school groups served by the PCU in Porto and the sociodemographic and professional variables during the COVID-19 pandemic.
(iii) H_3: There is a relationship between fear of SARS-CoV-2 infection and anxiety, depression, and stress in teachers from the school groups served by the PCU in the municipality of Porto during the COVID-19 pandemic.
(iv) H_4: There is a relationship between adaptation to distance learning among teachers from the school groups served by the PCU in the municipality of Porto and anxiety, depression, and stress during the COVID-19 pandemic.
(v) H_5: There is a relationship between difficulty in falling asleep among teachers from the school groups served by the PCU in the municipality of Porto and anxiety, depression, and stress during the COVID-19 pandemic.

2.4. Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences, version 20. Descriptive statistics (means, standard deviations, and frequencies) were computed to characterize the sample.

To test relationships between variables, inferential analyses were conducted using independent-samples *t*-tests and one-way analysis of variance. These methods enabled the comparison of mean scores across categorical variables, such as gender, age group, and years of teaching experience. Where relevant, *post hoc* tests with Bonferroni correction were applied. Potential confounding was controlled by stratifying analyses according to key demographic variables (e.g., gender, age, teaching level) to ensure that observed differences were not solely attributable to these characteristics.

Subgroup analyses were conducted to examine specific hypotheses regarding differences by gender, marital status, age category, and years of professional experience. Interactions between selected variables were explored through comparison of mean scores within each subgroup; no interaction terms were included in multivariate models, given the descriptive design.

Missing data were minimal (<5%). Cases with more than 20% unanswered items were excluded according to pre-defined criteria. For the remaining instances of isolated missing responses, list-wise deletion was used to maintain analytic consistency.

As this was a cross-sectional study using a non-probabilistic convenience sample, analyses were not weighted for sampling probability. However, all respondents were drawn from the same population frame (teachers under one PCU) and analyzed as a single group to maintain internal consistency.

Sensitivity analyses were not performed, as the study's exploratory and descriptive focus, along with the small number of missing responses, did not warrant re-estimation under alternative assumptions.

2.4.1. Handling of quantitative variables

Quantitative variables, including subscale scores from the EADS-21 and domain and total scores from the FANTASTIC

lifestyle questionnaire, were analyzed as continuous data. Descriptive statistics were computed to summarize distributions. For inferential analyses, these quantitative outcomes were compared across sociodemographic and professional categories using independent-sample *t*-tests and one-way analysis of variance.

Categorical groupings were established for age (<51, 51–60, >60 years) and years of teaching experience (≤15 years, >15 years) to facilitate between-group comparisons and ensure adequate subgroup sizes. These cut-offs were determined based on the sample distribution and consistency with prior research on teacher stress and experience levels (Bermejo *et al*., 2015; Marques-Pinto *et al*., 2003). Statistical significance was set at $p<0.05$ for all analyses.

2.5. Ethical considerations

The study was conducted in accordance with ethical guidelines, and approval was obtained from the Ethics Committee of the University of Trás-os-Montes e Alto Douro. All participants received detailed information about the study's aims and procedures and provided informed consent before participation. Data were collected anonymously and treated confidentially, ensuring participant privacy and compliance with the General Data Protection Regulation.

This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cross-sectional studies to ensure transparency, reproducibility, and methodological rigor (von Elm *et al*., 2007). The completed STROBE checklist is included in Table S1.

3. Results

A total of 105 out of 292 teachers, who are part of the school groups served by a PCU in the municipality of Porto, participated in the study, resulting in a participation rate of 35.9%. In this sample, most participants were female (88.6%). Regarding age, the majority of teachers were older than 51 years (60%), while 6.7% were between 31 and 40 years old. More than half of the samples were married (56.2%), and most participants resided in urban areas (92.4%). In terms of professional activity, most teachers had been teaching for more than 15 years (86.7%). They also taught at different grade levels: 41.9% teach grades 7–9, 37.1% teach grades 10–12, and only 21% teach grades 5 and 6 (Table 1).

3.1. Working conditions during the COVID-19 pandemic

Regarding working conditions during the COVID-19 pandemic, 93.3% had to reorganize their working hours. Teachers reported that during the pandemic, they had to adapt their working methods, as distance learning was implemented, making their homes their workplaces and altering their daily routines (Table 2).

Regarding the time spent working remotely, around 70% worked remotely for 1–6 months, and 21.9% worked for 6 months–1 year. Regarding the level of satisfaction with remote work, 54.3% of participants reported being dissatisfied or very dissatisfied with this professional experience (Table 3).

3.2. The anxiety, depression, and stress scale and the FANTASTIC lifestyle questionnaire

When asked about some aspects of the COVID-19 pandemic, 94.3% of teachers reported having knowledge and

Table 1. Sociodemographic and professional characteristics of the study participants

Variable	Category	*n*	%
Gender	Male	12	11.4
	Female	93	88.6
Age	31–40	7	6.7
	41–50	35	33.3
	51–60	49	46.7
	>60	14	13.3
Marital status	Married	59	56.2
	Single	15	14.3
	Divorced	26	24.8
	Widowed	2	1.9
	De facto union	3	2.9
Residence area	Urban	97	92.4
	Rural	8	7.6
Levels of teaching	Grades 5 and 6	22	21.0
	Grades 7–9	44	41.9
	Grades 10–12	39	37.1
Teaching experience	<1 year	1	1.0
	1–5	1	1.0
	6–10	2	1.9
	11–15	10	9.5
	>15	91	86.7

Table 2. Working conditions during the COVID-19 pandemic

Conditions	*n*	%
Maintaining a structured daily routine	92	87.6
Defining a space at home to work	70	66.7
Reorganization of working hours	98	93.3
Influence of feelings of anxiety and worry at work	80	76.2

training on transmission prevention measures. However, only 51.4% reported taking sufficient pre-cautions to avoid the transmission of COVID-19. At some point, 89.5% of teachers had to change their lifestyle or family routines. It is worth mentioning that 14.3% of teachers reported having some form of dependency and that 11.4% had to increase their substance use during the pandemic period. For the EADS-21 and all of its subscales, the internal consistency coefficient, Cronbach's alpha, was >0.90 (excellent). For the fantastic lifestyle questionnaire, internal consistency ranged from 0.220 (very weak) to 0.926 (excellent). Regarding the EADS-21 scale (Table 4), the stress subscale had the highest mean score (0.98), followed by the depression subscale (0.66) and the anxiety subscale (0.53). Most teachers (86.7%) reported being afraid of contracting SARS-CoV-2, and 45.7% were infected or in contact isolation. According to the FANTASTIC lifestyle questionnaire (Table 4), it was found that the alcohol and drugs domain (mean = 22.63, maximum = 24) had the highest average value. The remaining domains, listed in increasing order of their average values, were as follows: Nutrition (mean = 8.61, maximum = 12); insight (mean = 8.17, maximum = 12); sleep/stress (mean = 7.87, maximum = 12); other behaviors (mean = 7.77, maximum = 8); care for health and sexuality (mean = 7.73, maximum = 12); family and friends (mean = 6.9, maximum = 8); tobacco (mean = 6.86, maximum = 8); work/personality type (mean = 6.15, maximum = 12); and activity (mean = 5.98, maximum = 12).

Table 3. Remote working arrangement and level of satisfaction

Duration of remote working arrangement (months)	*n*	%	Satisfaction level	*n*	%
<1	5	4.8	Very dissatisfied	10	9.5
1–6	73	69.5	Dissatisfied	47	44.8
6–12	23	21.9	Satisfied	46	43.8
>12	4	3.8	Very satisfied	2	1.9
Total	105	100.0		105	100.0

Table 4. Results of the anxiety, depression, and stress scale and the FANTASTIC Lifestyle questionnaire

Tool	Minimum	Maximum	Mean	Standard deviation
Anxiety, depression, and stress scale				
Depression	0.00	3.00	0.66	0.73
Anxiety	0.00	3.00	0.53	0.69
Stress	0.00	3.00	0.98	0.70
FANTASTIC lifestyle questionnaire				
Family and friends	0.00	8.00	6.90	1.86
Activity	0.00	12.00	5.98	2.99
Nutrition	0.00	12.00	8.61	2.36
Tobacco	0.00	8.00	6.86	2.51
Alcohol and drugs	16.00	24.00	22.63	1.74
Sleep/stress	0.00	12.00	7.87	3.32
Work/personality type	0.00	12.00	6.15	2.94
Insight	0.00	12.00	8.17	3.19
Care for health and sexuality	0.00	12.00	7.73	2.70
Other behaviors	4.00	8.00	7.77	0.70

Based on the overall assessment of the FANTASTIC lifestyle questionnaire, we found that 47.6% of teachers have a very good lifestyle; however, approximately 13.3% revealed a regular lifestyle that requires improvement. Notably, most teachers (86.7%) reported that their lifestyle has a significant impact on their health (Table 5).

In Table 6, addressing Hypothesis 1, the results regarding the relationship between anxiety, depression, stress, and gender, age, marital status, and education levels show that there are no statistically significant differences. The results regarding the relationship between anxiety, depression, and stress and years of experience showed that teachers with ≤15 years of professional experience had a higher average value (1.04) than teachers with more than 15 years (0.61), demonstrating a statistically significant relationship.

All analyses were conducted using unadjusted estimates, given the exploratory and descriptive nature of the study. Mean differences between groups were assessed using *t*-tests and one-way analysis of variance, and statistical significance was determined at $p<0.05$. Effect sizes (Cohen's d or η^2) were calculated to indicate the magnitude of differences where appropriate. No multivariate adjustment was performed because potential confounders, such as age, gender, and years of teaching experience were analyzed separately through stratified comparisons.

Continuous variables were categorized to facilitate subgroup analyses: Age (<51 years, 51–60 years, >60 years) and years of teaching experience (≤15 years, >15 years). These cut-offs were determined based on the sample distribution

Table 5. FANTASTIC lifestyle questionnaire overall score

Variables	*n*	%
Needs to be improved	3	2.9
Regular	11	10.4
Good	23	22.0
Very good	50	47.6
Excellent	18	17.1
Total	105	100.0

Table 6. Relationship between the anxiety, depression, and stress scale and sociodemographic variables

Variables	Depression		Anxiety		Stress	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Gender						
Female	0.69	0.76	0.56	0.71	1.01	0.72
Male	0.48	0.53	0.30	0.56	0.80	0.59
p-value		0.484		0.145		0.467
Age (years)						
<51	0.73	0.74	0.59	0.72	1.06	0.77
51–60	0.54	0.63	0.44	0.57	0.91	0.60
>60	0.92	0.98	0.68	0.99	1.03	0.88
p-value		0.327		0.577		0.747
Marital status						
Single	0.66	0.77	0.64	0.79	1.11	0.78
Married	0.63	0.70	0.49	0.65	0.97	0.67
Divorced	0.69	0.82	0.56	0.78	0.88	0.73
p-value		0.881		0.517		0.548
Years of teaching						
≤15 years	1.04	0.85	0.87	0.91	1.30	0.84
>15 years	0.61	0.70	0.48	0.65	0.94	0.68
p-value		0.039*		0.067		0.079
Teaching level						
Grades 5 and 6	0.75	0.75	0.65	0.69	1.22	0.61
Grades 7, 8, and 9	0.69	0.70	0.47	0.67	0.94	0.64
Grades 10, 11, and 12	0.59	0.78	0.54	0.74	0.91	0.81
p-value		0.280		0.387		0.215

Note: Statistical significance was defined as *$p \leq 0.05$.

and previous literature on teacher stress and professional experience (Bermejo *et al.*, 2015; Marques-Pinto *et al.*, 2003).

Regarding Hypothesis 1, it can only be partially accepted, as a significant association emerged solely between the EADS-21 depression subscale and years of professional experience.

According to several authors (Marques-Pinto *et al.*, 2003; Stoeber & Rennert, 2008), teachers are often stressed due to the nature of their profession. As reported by other studies, there is no relationship between stress levels and age, sex, or marital status. Regarding years of professional experience, teachers with fewer years of experience have higher levels of depression and stress; however, other studies indicate that teachers with more professional experience have higher levels of stress (Bermejo *et al.*, 2015; Gomes & Quintão, 2011).

However, there is still very little literature regarding anxiety, depression, and stress faced by teachers during the pandemic.

In addressing Hypothesis 2, we found statistically significant differences in the relationship between the FANTASTIC lifestyle questionnaire and gender, with the values of physical activity/associations being higher in males (mean = 8.00; p=0.006) as well as the values of sleep/stress (mean = 10.00; p=0.021) (Table 7). Regarding marital status, statistically significant differences were found, with values relating to family and friends being significantly higher among married individuals than among single individuals. In addition, insight scores were higher in divorced individuals compared to those who were single. No statistically significant differences were found between age, years of experience, and educational level.

Hence, given the findings, Hypothesis 2 can be partially supported, as associations were observed only between the FANTASTIC lifestyle questionnaire and the sociodemographic variables of gender and marital status.

Table 8 shows the results regarding the relationship between fear of SARS-CoV-2 infection and anxiety,

Table 7. Relationship between the FANTASTIC lifestyle questionnaire and sociodemographic variables

Variables	Statistics	FANTASTIC lifestyle questionnaire domains									
		Family and friends	Activity	Nutrition	Tobacco	Alcohol and drugs	Sleep	Work/ personality type	Insight	Care for health and sexuality	Other behaviors
Gender											
Female	M	6.86	5.72	8.56	6.92	22.69	7.59	6.04	8.04	7.61	7.83
	SD	1.80	3.02	2.38	2.49	1.73	3.40	3.04	3.20	2.80	0.56
Male	M	7.17	8.00	9.00	6.33	22.17	10.00	7.00	9.17	8.67	7.33
	SD	2.33	1.91	2.17	2.67	1.80	1.48	2.00	3.01	1.56	1.30
p		0.288	0.006**	0.554	0.292	0.230	0.021*	0.265	0.212	0.265	0.070
Age (years)											
<51	M	7.29	5.71	8.43	7.10	22.86	7.57	6.10	7.95	8.00	7.62
	SD	1.58	2.88	2.67	2.26	1.66	3.41	2.46	3.26	2.69	0.79
51–60	M	6.78	6.16	8.90	6.78	22.49	8.20	6.33	8.33	7.76	7.84
	SD	1.77	3.13	1.96	2.54	1.71	3.19	2.98	2.87	2.37	0.69
>60	M	6.14	6.14	8.14	6.43	22.43	7.57	5.71	8.29	6.86	8.00
	SD	2.66	2.98	2.66	3.16	2.10	3.61	4.14	4.14	3.74	0.00
p		0.227	0.728	0.578	0.760	0.417	0.683	0.786	0.798	0.649	0.059
Marital status											
Single	M	6.40	6.93	8.40	6.80	22.93	6.80	4.67	6.27	6.93	7.87
	SD	1.55	3.45	3.14	2.81	1.98	3.28	3.27	2.37	2.49	0.52
Married	M	7.22	5.80	8.54	7.12	22.58	7.76	6.34	8.47	7.80	7.73
	SD	1.62	2.77	2.25	2.17	1.66	3.32	2.73	3.11	2.72	0.78
Divorced	M	6.54	6.08	8.85	6.62	22.69	8.85	6.77	8.69	8.08	7.85
	SD	2.30	3.37	2.20	2.76	1.78	3.21	2.94	3.30	2.62	0.54
p		0.046*	0.450	0.725	0.752	0.404	0.121	0.066	0.012**	0.295	0.744
Years of experience											
<15 years	M	6.43	5.71	8.00	5.86	22.57	6.71	5.29	7.29	7.43	7.71
	SD	2.24	2.92	3.51	3.55	1.99	3.89	2.30	3.47	2.41	0.73
>15 years	M	6.97	6.02	8.70	7.01	22.64	8.04	6.29	8.31	7.78	7.78
	SD	1.80	3.02	2.14	2.30	1.71	3.21	3.02	3.14	2.76	0.70
p		0.208	0.703	0.670	0.262	0.892	0.197	0.188	0.261	0.523	0.632
Teaching level											
Grades 5 and 6	M	6.64	6.09	8.55	7.00	22.91	7.27	5.91	6.82	7.64	7.82
	SD	2.34	2.65	1.97	2.37	1.60	3.63	2.99	2.94	2.94	0.59
Grades 7, 8, and 9	M	6.82	6.18	8.36	7.14	22.64	7.91	5.95	8.45	7.73	7.86
	SD	1.79	3.31	2.63	2.22	1.71	3.08	3.06	3.02	2.78	0.51
Grades 10, 11, and 12	M	7.13	5.69	8.92	6.46	22.46	8.15	6.51	8.62	7.79	7.64
	SD	1.64	2.85	2.24	2.88	1.86	3.45	2.82	3.38	2.55	0.90
p		0.618	0.685	0.615	0.760	0.593	0.606	0.672	0.054	0.995	0.420

Note: Statistical significance was defined as *$p \leq 0.05$; **$p \leq 0.01$.
Abbreviations: M: Mean; SD: Standard deviation.

Table 8. Relationship between fear of SARS-CoV-2 infection and anxiety, depression, and stress

Parameters	No fear		Experienced fear		*p*-value
	Mean	Standard deviation	Mean	Standard deviation	
Depression	0.51	0.79	0.69	0.73	0.088
Anxiety	0.44	0.59	0.55	0.72	0.889
Stress	0.91	0.67	1.00	0.72	0.659

depression, and stress (Hypothesis 3), with no statistically significant differences.

Based on these results, Hypothesis 3 cannot be accepted. However, most teachers (86.7%) reported being afraid of contracting SARS-CoV-2, and 45.7% were infected or in contact isolation.

Table 9, in addressing Hypothesis 4, shows the results regarding the relationship between adaptation to the distance learning modality and anxiety, depression, and stress. Regarding the stress subscale, teachers who adapted to the distance learning modality showed a higher average value (1.13) than those who did not adapt to this teaching modality (0.71), indicating a statistically significant relationship.

Given the results, Hypothesis 4 can be partially accepted, as there was only a significant relationship between adaptation to the distance learning modality and the stress subscale in EADS 21.

According to other studies, teachers who have adapted to distance learning face increased stress due to the increased workload, the effort expended on planning classes using technological resources, and the need to comply with subject programs. It is also important to highlight that teachers had to work from home, having to adapt their routines to their family and professional lives, which at times became complex, leading to more stress and anxiety. Distance learning, as a learning strategy implemented to overcome the constraints caused by the COVID-19 pandemic, contributed to increased stress levels in teachers (Barreto & Rocha, 2020; Saraiva *et al.*, 2020).

Table 10 shows the results regarding the relationship between difficulty falling asleep and anxiety, depression, and stress, to address Hypothesis 5. There were statistically significant differences in all subscales, with the average value being higher for teachers who had difficulty falling asleep. The subscale with the highest mean value was the stress subscale (2.03), followed by depression (1.81) and anxiety (1.49).

Table 9. Relationship between adaptation to distance learning and anxiety, depression, and stress

Parameter	No		Yes		*p*-value
	Mean	Standard deviation	Mean	Standard deviation	
Depression	0.51	0.56	0.74	0.80	0.120
Anxiety	0.36	0.54	0.62	0.75	0.066
Stress	0.71	0.59	1.13	0.73	0.004**

Note: Statistical significance determined at **$p \leq 0.01$.

Table 10. Relationship between difficulty falling asleep and levels of anxiety, depression, and stress

Parameter	Yes		No		*p*-value
	Mean	Standard deviation	Mean	Standard deviation	
Depression	1.81	0.72	0.37	0.46	0.001***
Anxiety	1.49	0.87	0.20	0.37	0.01***
Stress	2.03	0.51	0.64	0.46	0.001***

Note: Statistical significance determined at ***$p \leq 0.01$.

Given the results obtained, Hypothesis 5 can be accepted. This result is also supported by other studies, which demonstrate difficulty in falling asleep due to high levels of stress, depression, and anxiety as a result of the increased work demand related to the increase in workload, adaptation to distance learning, and adaptation to new life routines, both professionally and personally. Among the 105 teachers who participated in this study, most were females and were in the age group over 51 years old. Regarding professional activity, most have been teaching for over 15 years, with experience spanning grades 5 and 6, 7–9, and 10–12.

Regarding working conditions during the COVID-19 pandemic, most participants had to reorganize their working hours, adjust their teaching methods, adapt their living arrangements, and modify their daily routines. Most teachers worked remotely for 1–6 months and demonstrated dissatisfaction with the distance learning method. Most teachers reported being concerned about contracting SARS-CoV-2.

The stress subscale of the EADS-21 scale yielded the highest average value, whereas the alcohol and drugs domain in the FANTASTIC lifestyle questionnaire had the highest average value, while the physical activity/associations domain had the lowest average value. Within the scope of the formulated hypotheses, it was found that: (i) Teachers with ≤15 years of professional experience

presented the highest average value in the depression subscale, (ii) teachers who adapted to the distance learning modality presented a higher average value for the stress subscale, and (iii) teachers who had difficulty falling asleep had a higher average value in all subscales (anxiety, depression, and stress).

4. Discussion

The findings of this study align with previous research indicating that educators experienced heightened stress and anxiety during the COVID-19 pandemic (Mthembu & Finestone, 2024; Pressley *et al.*, 2021; Punia & Rajan, 2024). The transition to remote teaching posed significant challenges, including an increased workload, reduced social interaction, and difficulties in balancing professional and personal responsibilities (Leech *et al.*, 2022; Nowrouzi-Kia *et al.*, 2024). Teachers with fewer years of experience exhibited higher mean scores on the depression subscale, indicating greater emotional strain in this subgroup. While causality cannot be established due to the study's cross-sectional design, these results are consistent with prior research showing that less experienced teachers often report higher vulnerability to occupational stress under abrupt work transitions. One possible explanation is that while younger teachers may be more technologically adept, they might have less experience managing occupational stress, making them more vulnerable to emotional exhaustion (Schulze-Hagenest *et al.*, 2023). Further exploring this dynamic would provide a more nuanced understanding of the results.

Although the statistical findings were clearly presented, a more detailed discussion of effect sizes and confidence intervals would further enhance the assessment of practical significance. While significant differences were observed, understanding the magnitude of these effects would clarify their real-world implications. For instance, although teachers who struggled with sleep difficulties exhibited higher scores in anxiety, depression, and stress, knowing the extent of this impact could inform targeted interventions.

The dissatisfaction with remote teaching expressed by more than half of the participants highlights the struggles of remote teaching, such as technological barriers, a lack of student engagement, and an unclear separation between work and home life. In addition, lifestyle changes, including poor sleep quality and increased stress, further exacerbated mental health concerns. Taken together, these findings highlight the importance of institutional support systems in helping educators manage stress and maintain a healthier work–life balance.

Given the well-established connection between diet and mental health, such interventions can serve as valuable tools for promoting well-being among educators. Future programs could integrate other wellness strategies, such as mindfulness training and stress management workshops, to offer a more comprehensive approach to educator well-being.

Beyond individual interventions, there are broader policy implications for teacher training, workload management, and mental health support. The findings suggest that educational institutions and policymakers should prioritize initiatives that address teacher well-being. This includes integrating mental health resources into professional development programs, promoting reasonable workload distribution, and ensuring access to counseling and stress management support. Policies encouraging flexible work arrangements, peer support networks, and resilience training could help create a healthier and more sustainable teaching environment (Cohen *et al.*, 2023; Weideman & Hofmeyr, 2020).

Overall, the findings should be interpreted with caution, considering the methodological constraints and contextual specificity of the sample. Nevertheless, the observed associations offer valuable preliminary evidence to inform future longitudinal and intervention-based research on teacher well-being.

4.1. Limitations

Despite the study's contributions, several limitations must be acknowledged. First, the use of a non-probabilistic convenience sample restricts the generalizability of the findings beyond the specific educational context examined. Second, data collection relied on self-reported questionnaires, which may introduce recall bias and social desirability effects. Third, the cross-sectional design limits the ability to infer causal relationships between lifestyle, stress, and anxiety variables. Finally, while internal consistency measures confirmed reliability, other aspects of construct validity, such as test–retest stability, were not assessed. Future research using longitudinal and mixed-methods designs could provide deeper insights into the evolving mental health trajectories of educators in the post-pandemic period.

4.2. Future research

Future research should employ longitudinal designs to assess the long-term effects of lifestyle interventions on the mental health and professional performance of educators. Expanding the sample size and incorporating qualitative data could provide deeper insights into

teachers' lived experiences and coping mechanisms during crises. In addition, exploring the effectiveness of multiple intervention strategies, such as mental health counseling and flexible work policies, could further support teacher well-being.

4.3. Overall interpretation

The findings of this study provide evidence that teachers experienced elevated levels of stress and anxiety during the COVID-19 pandemic, accompanied by notable lifestyle changes. These results align with previous international research demonstrating that educators worldwide faced increased psychological distress and disrupted well-being during this period (Pressley *et al*., 2021; Punia & Rajan, 2024). The association between fewer years of teaching experience and higher depression scores suggests that professional maturity may serve as a protective factor against emotional strain—an observation consistent with prior occupational stress literature. However, the absence of significant differences across most demographic variables indicates that the pandemic's psychological impact was widespread rather than confined to specific subgroups.

Interpretation of these results should remain cautious, considering the study's cross-sectional design, use of self-reported measures, and convenience sampling, which may limit generalizability and preclude causal inference. While multiple analyses were conducted to explore associations among lifestyle, stress, and anxiety, findings should be regarded as exploratory and hypothesis-generating rather than confirmatory. Nevertheless, the convergence of these results with similar international studies strengthens confidence in their relevance and provides valuable, context-specific insights into educator well-being in Portugal during times of crisis.

4.4. Generalizability of findings

The results of this study should be interpreted with consideration of its contextual scope. Given that the data were obtained from a non-probabilistic sample of teachers from two school groups served by a PCU in northern Portugal, the findings may not be fully generalizable to educators in other regions or educational systems. Differences in institutional resources, local pandemic responses, and cultural attitudes toward mental health could influence stress and lifestyle outcomes elsewhere. Nevertheless, the sociodemographic profile of the participants and the consistency of observed trends with findings from international studies suggest that the results provide relevant insights applicable to similar professional and educational contexts, particularly within Southern European settings. Further research using larger and more diverse samples is warranted to enhance external validity and facilitate a more comprehensive understanding.

5. Conclusion

This study highlights the significant impact of the COVID-19 pandemic on teachers' stress levels, anxiety, and lifestyle habits. Findings indicate that educators, particularly those with fewer years of experience, faced heightened levels of depression and stress. In addition, factors, such as sleep difficulties, adaptation to remote teaching, and dissatisfaction with remote teaching contributed to increased mental health challenges.

Beyond these findings, the study underscores the importance of practical applications in supporting educators' mental health. School administrators and policymakers should consider implementing mental health programs, workload adjustments, and professional development initiatives that equip teachers with coping strategies for managing stress. Integrating well-being initiatives—such as flexible work policies, counseling services, and mindfulness training—could create a more sustainable and supportive work environment.

A key takeaway is that supporting educators' mental health should extend beyond crises, such as COVID-19. Long-term strategies prioritizing teacher well-being can enhance job satisfaction, professional performance, and student outcomes, ensuring a healthier and more resilient educational workforce. Future research should investigate sustainable interventions that support educators' mental health during both crisis and non-crisis periods.

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Conflict of interest

The authors declare they have no competing interests.

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Ethics approval and consent to participate

The study was conducted in accordance with ethical guidelines, and approval was obtained from the Ethics Committee of the University of Trás-os-Montes e Alto Douro (Doc16-CE-UTAD-2022). Data confidentiality and anonymity were maintained throughout the research process. Participants provided written informed consent to participate.

Consent for publication

Written informed consent was obtained from all participants.

Availability of data

Data supporting the findings and conclusions are available upon request from the corresponding author.

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